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AUTHOR Lawrence, Barbara: And Others
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ABSTRACT

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Barbara Lawrence
Exxon Research and Engineering Company
Analytical and Information Division
P. O. Box 121
Linden, NJ 07036

Evelyn G. Burtis
Patricia Hodge
Robert E. Wood
Exxon Corporation
Research and Environmental Health Division
P. O. Box 45
Linden, NJ 07036

The Information Needs of Environmental Health Professionals in a Large Industrial Organization

ABSTRACT

Development of a unified information handling program to meet the needs of a rapidly growing environmental health staff was achieved by using systems analysis techniques to evaluate both information needs and existing information services. The evaluation resulted in clear recognition of the information transfer role of these health professionals, and awareness that their information use patterns are not the same as those usually found among research scientists. The strong features of the existing manual systems were incorporated into the new automated systems, while redundant efforts and search times were reduced. The computer systems employed were not developed specifically for this project, but were particular applications of a multifaceted information handling system previously developed by Exxon.

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INTRODUCTION

The Research and Environmental Health Division (REHD) of the Medical Department of Exxon Corporation provides assistance to Exxon companies world-wide in the recognition and management of environmental and occupational hazards.

The Division has long had an active information component, even when the staff was small in number. The information transfer nature of the group, the ease with which sensitive medical and toxicological data can be misinterpreted, and the extremely active use of the Division's information resources easily justify support of the information activity.

Information service has been important since the formation of the Medical Research Division (the previous Division name) in 1951; the in-house abstract service began in 1957. The basis of the system, for both published and proprietary literature, was a classification scheme which was used to file proprietary documents (reports, memos, correspondence, test data) in one collection, and to file abstracts or index entries of articles, books, and external reports for a published literature collection.[1] The literature system included a current awareness function (distribution of abstract cards to Exxon Medical Directors, Industrial Hygienists, and others world-wide) as well as maintenance of the card file for searching.

Exxon Corporation seeks actively to assure that its operations and products do not create unacceptable risks to the health of employees, customers, the public, or to the environment. Increasing toxicological knowledge, increased government regulation (particularly TSCA and OSHA), improved technology for hazard detection, and increased awareness of potential hazards from long-term exposure to low levels of contaminants, have led to an expanded need for environmental health research programs in Exxon. Thus, REHD began to grow, placing a strain on the information service as it faced these growing and changing user needs.

Growth Indicators

There are several indicators of the increased use of REHD information services. To begin with, in the four years from 1974 to 1978, the staff increased three-fold, as shown in Figure 1. This was the result of expanding Corporate interests that brought demands for information in new subject areas such as epidemiology, aquatic toxicology, and coal mining and conversion.

In the library, expenditures for outside services or materials increased at an extraordinary rate; almost 800 percent since 1970, and almost 300 percent since 1976 (Figure 2). Journal

Growth Indicators (continued)

subscriptions and book purchases also had a significant upturn in recent years (Figure 3), because of both staff growth and increased activity in the environmental health professions. Since 1974 the number of journal titles received each year in the library went from 117 to 182; the number of books purchased annually went from 36 to 180.

The proprietary files showed strains as well. The filing cabinets could no longer fit in the space allotted. Some categories had grown so large that searching was almost impossible, except perhaps by the experienced long-time staff who had grown up with the system and its contents.

As examples, the LEAD (PB) file occupies 41.5 inches, with the first document dating back to 1924. The POLYNUCLEAR AROMATICS file occupies 11 inches, and the BENZENE file requires 25 inches. The sheer size of these files made searching time-consuming and also made it easy to miss what one was looking for. The experienced staff have some extra clues to help them, such as a time frame, a remembered document, or an organizational reminder; but the new staff is easily frustrated by the vast amount of material, even while they recognized the immense value of the content of the collection, and the training potential inherent in the ability to browse through a classified paper file.

STUDY

The Division initiated the REHD Information Systems Project in response to these obvious pressures. The study team was initially composed of four persons: Barbara Lawrence, the consultant from Exxon Research and Engineering Company with experience in internal and external computer systems, systems analysis, and user training; Robert Wood, the REHD Planning and Services Manager and with responsibility for the information function; Patricia Hodge, the REHD librarian since 1966; and Evelyn Burtis, a toxicologist who developed the thesaurus and who also has responsibilities as technical advisor for REHD information activities.

Objectives

The first step was to establish a set of objectives which were regularly reviewed (and modified) as we went along.

The first overall objective was to unify the information function for compatibility and efficiency. The library and files now report to the same manager. The information staff, also known as the Project Team, hold regular meetings to exchange developments and share decision making.

Objectives (continued)

The second overall objective was to use modern information technology to maximize retrievability and efficiency.

Specific objectives for the library and files follow:

Library

- Decrease search time required by REHD staff and thereby improve their response time to affiliates.
- Provide retrieval resources that allow flexibility in the type of query handled.
- Provide a favorable work environment for both the information staff.

Files

- Institute procedures to guarantee a comprehensive information system.
- Improve indexing depth and searchability features.
- Provide a correspondence follow-up system for management.

Study Process

The study process involved system descriptions[2], data gathering, evaluations, and regular communication. Formal reports, minutes of project team meetings, and presentations were used to keep REHD staff and management informed of and involved in our activities.

Good communication was as critical as identifying existing processes or learning whether or not anyone wanted any information anyway. People may express dissatisfaction with what they have and yet still resist change. We wanted the users to understand that we aimed to provide a better service, and that they were to let us know if it wasn't better.

USER SURVEY

The most interesting findings of the study were data on how Exxon Environmental Health professionals make use of information. By information we are really talking about documents and document surrogates--we were asking questions related primarily to the use of the Literature Abstracting and Indexing Program.

Information Use Patterns - REHD

As might have been expected, the survey revealed a variety of information use patterns among REHD staff, but some generalizations can be drawn.

(1) There was an extraordinarily high use of information by all members of the Division. In a sense, REHD is primarily an information transfer group. Managers were light direct-users of the information systems, but did make regular requests for information retrieval assistance from both the library and files. The other members of the Division, regardless of whether they describe themselves as light, medium, or heavy users, averaged at least one search per week, and many searched at least once each day.

(2) Minimal archival information was kept in staff offices. There are several notable exceptions, but in general, much of the staff kept active project files and references works only, relying heavily on the library and files for information storage and retrieval.

(3) The primary use of the Literature Program is for searching. The abstract distribution was used to catch missed items, to note items-to-be-read, and for awareness in peripheral interest areas.

(4) Primary literature was used and valued more highly than secondary information tools. The most trusted numerical data were from the primary literature (journal article or report). Books or compilations, although used, were suspect, and no abstracts were trusted for their numbers.

(5) Use patterns and degree of user comfort varied according to experience. At the time of the study, there was a clear three-part division within REHD: 1) long-time staff; 2) 2.5-3 years; 3) less than one year. The first group knew how to search and had the time-frame experience to provide a starting point. The second group had a reasonable success rate, but found the retrieval systems less than satisfactory. The third, least-experienced group valued the content, but did not like the system, found searching too slow, and lacked confidence in its use. This was not a surprising finding, but it encouraged us to plan for new users. The growth projection for REHD anticipates a steady influx of new staff, and even now the newly-hired staff outnumbers the old.

Information Use Patterns - NON-REHD

Medical directors and industrial hygienists in Exxon affiliates worldwide also receive the abstracts. The last time these users were formally canvassed was some twenty years ago, at the origin

of the program. Of course, there has been informal feedback since that time. These users also rely on the system for their information, and they do use information.

There were perceptible differences of purpose between the industrial hygienists, for whom this is a primary information source, and the clinicians, for whom this is of secondary importance. Differences between U.S. and foreign recipients related to information accessibility. None of these differences were unexpected.

The information-use patterns of this group can be described as follows.

(1) The service was extensively used and valued. Only two respondents did not use the service and asked to be removed from the distribution list; both were no longer involved in health activities. Eighty percent of respondents always read the abstracts; over half of the respondents read them within a week. As mentioned above, the degree of relevance varied for industrial hygienists and clinical practitioners, but both groups valued the service.

(2) Almost all kept the abstracts, at least selectively. It was generally their only on-hand search tool.

(3) Other information services used included the Industrial Hygiene Digest, Bureau of National Affairs newsletters, the Environmental Health Letter, and journals. The REHD and BNA services were the most highly regarded.

(4) Organization of the abstracts by broad subject areas within each package would be useful for scanning and for filing. For this reason the recipients liked cards. However, we think that an indexed abstract bulletin would be acceptable; and that is what we are now producing.

HIGHLIGHTS OF RESULTS

Goals

Before we describe some of the new systems, let us restate some of our goals. Based on what we learned from the user surveys and system description, we wanted the retrieval system to be easy-to-use, be easy-to-learn, provide deep indexing, and be cost effective. We also wanted to increase efficiency, and to decrease redundancy in the production end of the system.

Strategy

We agreed that three strategic principles were important in order to successfully achieve a modernized information service, responsive to expressed user requirements.

First, we were very conscious of the need to maintain the strength of the existing information system, with its unique proprietary focus, its constant accessibility to users (file cabinets don't go "off-line," or "crash"), and its parallel structure for the internal and external information bases.

Second, we wanted to approach change in an evolutionary fashion, to allow for experimentation, modification, and gradual absorption of new methods.

The use of regular communication and user education constituted the third strategic principle. We didn't want this close-knit user community to be surprised by changes or to feel cut off from their much-needed information.

On-Line Searching

One significant advance was the introduction of online search systems for information retrieval, the value of which is now well established. Making the search facilities of several vendors available has obviously been an improvement over searching the limited manual secondary sources in the library--improvement in quantity, quality, and timeliness.

A comparative study, even though it was not methodologically rigorous, revealed two particular benefits for REHD's use of on-line searching. Since overlap between the in-house system and several key data bases was surprisingly small, use of these extended services complements, but does not replace, the in-house system. But a corollary is that expansion of the in-house service to cover new subjects or new journals could be minimized, in places where the external data bases provide adequate coverage.

Computer Assisted System

At the heart of all the change is use of an already-existing, Exxon-developed information handling program. This modular program uses a minicomputer data-entry system, and a main frame (IBM 370) for database building, database manipulation, and product output. The products are most often indexes to a collection, but may also be purchase orders or journal routing slips.

Journals

We have so far used the system in several areas. For example, the journal handling module provides up-to-date routing slips, purchase orders, a holdings list, and a variety of other reports.

Technical Correspondence

Technical Correspondence has now used the system for over two years. For this data base we used one application of the thesaurus capability wherein the computer provides extensive editing on index concepts. The actual thesaurus was developed by Burtis, but the computer provides automatic synonym translation, provides global revisions, allows use of abbreviations in data entry, and regularly updates the thesaurus. Data is entered in the computer once, and the documents need only be filed once in reference number order. The indices to correspondence can be searched by author, recipient, corporate author, corporate recipient, title words (using a key-word-in-context index), and controlled vocabulary concepts. The entire data base--index and source documents--can be made available in several locations since they are on microfiche.

Literature Program

The Literature Program uses the system in an all-encompassing manner. Information on books, journal articles (with or without abstracts), and reports are entered. Words from the title and text are automatically matched against the thesaurus (basically the same as the one used for correspondence) to provide an in-depth controlled vocabulary index. Other indexes (author, key-word-in-context, report numbers), along with abstract bulletins, and the book catalog are also produced. Different products, in Computer-Output-Microfilm or paper formats, are developed for different user groups. The operation gained in efficiency with the use of the computer system. There is no more card filing, which previously took 72 days/year; no more double handling of books which were previously entered separately for the catalog and abstracts; and no more retyping abstracts or limited subject access.

CONCLUSION

If we had time we could describe the before and after pictures in detail. The time savings alone justify the changes, but the payout is in better quality information service and happier users (and librarians and information specialists).

Conclusion (continued)

The primary words of wisdom that emerge from our efforts are first that:

1. Environmental health professionals in our corporate setting use information more actively than any other group we've ever seen; and

2. If you plan to modernize your information service, a systematic approach--including user surveys, goal setting, evaluation, documentation, analysis, flow charting, experimentation, and regular communication with management and users--will help you achieve your goals.

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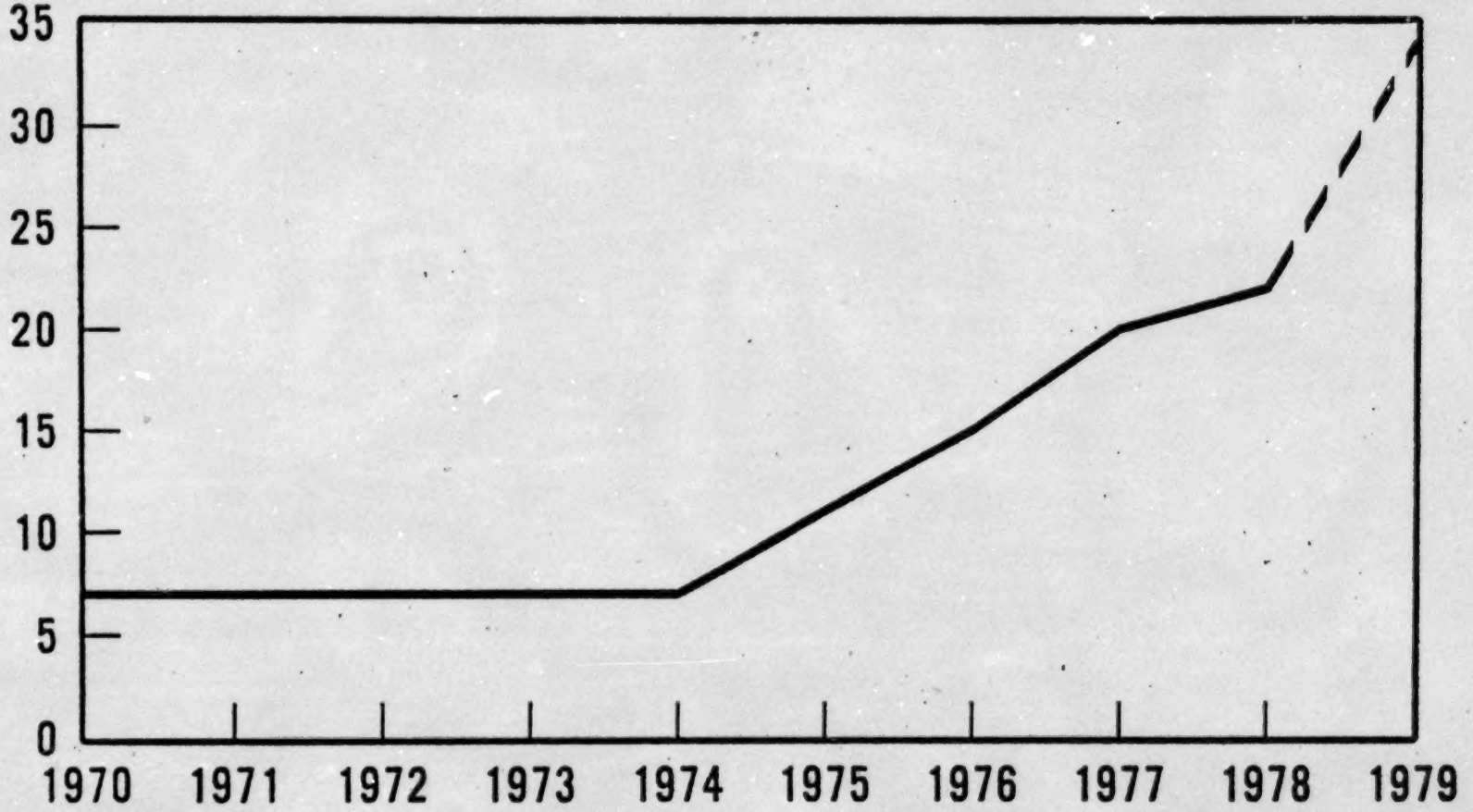
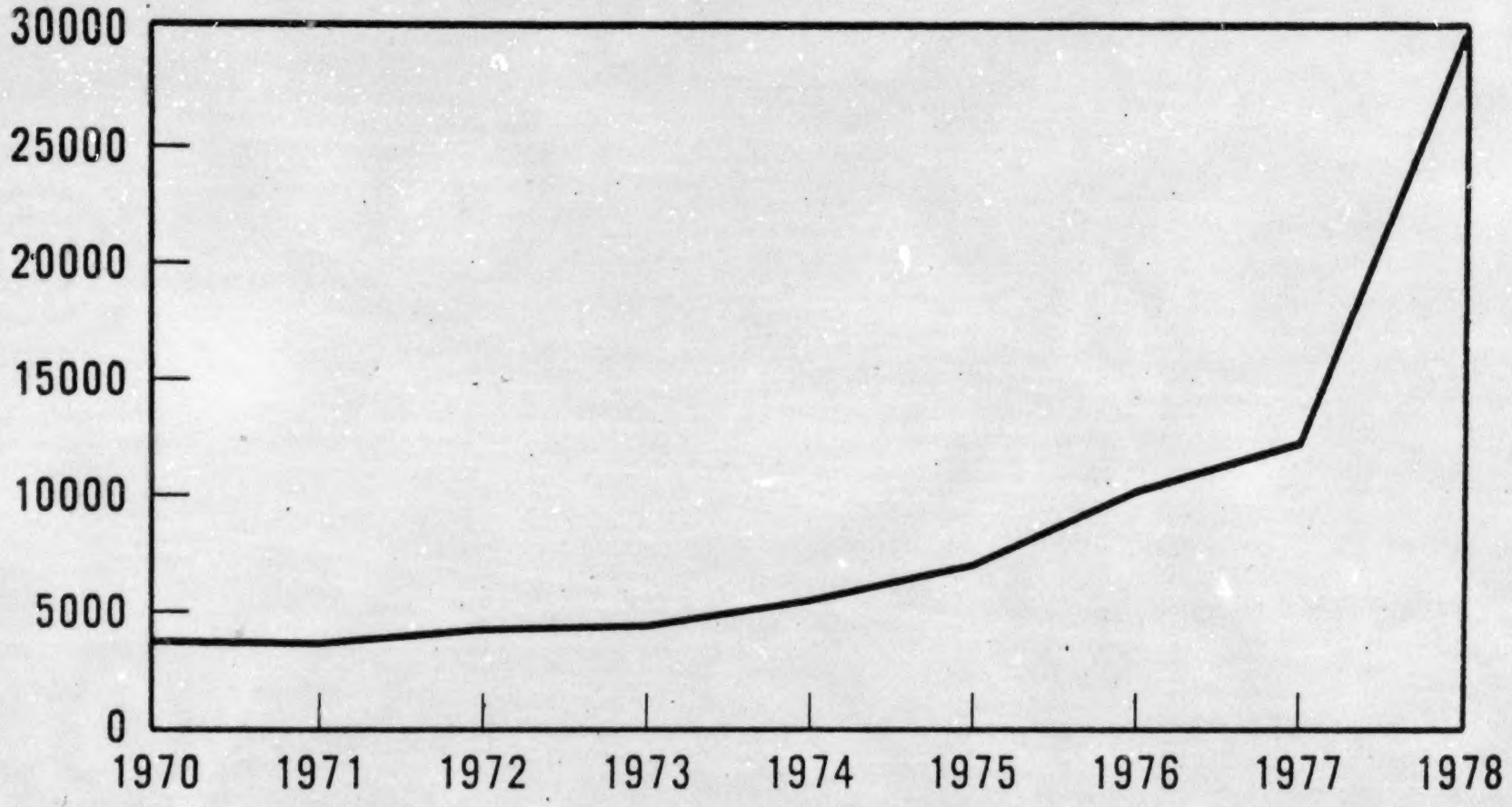
REHD PROFESSIONAL STAFF GROWTH



GROWTH OF LIBRARY EXPENDITURES



BOOKS AND JOURNALS IN THE REHD LIBRARY